(c) whether Government have secured any business in the space market so far;

(d) if so, the value of exports executed so far; and

(e) the projected business prospects of the Antrix Corporation Ltd.?

THE MINISTER OF STATE IN THE PRIME MINISTER'S OFFICE (SHRI BHUVNESH CHATURVEDI): (a) Yes, Sir. Antrix Corporation Limited is set-up by Government of India under the Administrative control of Department of Space for international/national marketing of Space products and services from India.

(b) The main objectives and the corporate plans of the Corporation are:

(i) Marketing Space products and services in India and abroad.

(ii) Deal with the transfer of technologies developed under the Indian Space Programme to the Indian industries and provide consultancy service.

(iii) Coordinate the Space hardware and software production among ISRO and various Indian industries involved in the Space programme.

(iv) To promote, establish and participate in any collaborative ventures with any company, association or institution for marketing Space hardware.

(c) Yes, Sir. These are as follows:

(i) Study definition of Space Segment System and Assessment of Associated Technologies of LEO Constellation for Hand Held (INMARSAT-P) Services.

(ii) Design, Implementation and Evaluation of Small Omni-directional L/S/UHF Antenna for the INMARSAT-P Hand Held Phone.

(iii) Export of propellant chemicals to LAPAN, Indonesia.

(iv) Providing on-the-job training for Korean Engineers from ETRI, Korea and ARABSAT Engineers.

(v) Benchmaking of FORTRAN Programmes for IBM, Singapore.

(d) US $ 200,000.

(e) The long term plans of the Corporation is to garner atleast 1% of the share of the anticipated world market of US $ 10 billion by 1997.

Damage of engine using cryogenic propellants by explosion

4395. SHRI KAMAL MORARKA: Will the PRIME MINISTER be pleased to state:

(a) whether it is a fact that an explosion had damaged an engine which used cryogenic propellants while testing it at the ISRO facility at Thiruvananthapuram;

(b) if so, the details of the blast;

(c) what are the main reasons for the blast;

(d) whether any enquiry has been conducted into the blast; and

(e) if so, the findings thereof?

THE MINISTER OF STATE IN THE PRIME MINISTER'S OFFICE (SHRI BHUVNESH CHATURVEDI): (a) There was a failure of cryo engine hardware during testing of ISRO's test facilities at Mahendragiri in the last week of June, 1993. This was only the failure of hardware and not explosion. There was no damage either to the facility or personnel.

(b) and (c) Several developmental tests have been conducted successfully on the sub-scale engine of one tonne thrust rating with gaseous Hydrogen and liquid Oxygen. In this particular test, for the first time, liquid Hydrogen and liquid Oxygen were used. Since the injection valves for Liquid Oxygen and Liquid Hydrogen are still under development, the test was conducted with a sequence of long chilling by Liquid Nitrogen through the engine.

The failure was due to partial blocking of nozzle throat by the frozen Liquid Nitrogen used for chilling the lines and the resultant over pressure and consequent ripping open of the engine hardware. Such failures are common during development of cryo engines.

(d) and (e) A failure analysis committee has, after analysing the test results, concluded that there was no problem with the engine and has recommended the use of injection valves for liquid Hydrogen and liquid Oxygen feed lines and Helium for purging in future tests.

Scientists working in Space Programmes

4396. SHRI TINDIVANAM G. VENKATRAMAN:
SHRI J. S. RAJU:

Will the PRIME MINISTER be pleased to

refer to the Unstrarred Question 1522 given in the Rajya Sabha on 5th August, 1993 and state :

(a) whether the research scientists working in various space programmes have guidelines about space research or the scientists have themselves set their goals;

(b) if so, what are those guidelines given in the recent years;

(c) the number of young scientists who are engaged in the space research in the country; and

(d) what are the emoluments being given to the scientists ?

THE MINISTER OF STATE IN THE PRIME MINISTER'S OFFICE (SHRI BHUVNESH CHATURVEDI) : (a) Research Scientists working in space programme have been provided with guidelines about space research. They also play an important role in evolving these guidelines, which are discussed in several forums of scientists, such as Research Groups, Space Centres, ISRO Council and finally approved by the Space Commission.

(b) Self-reliant and integrated space programme, through indigenous building and launching of satellites with maximal utilisation of industrial infrastructure in the country, forms the guideline for the scientists working in Indian Space Programme. The goal set for the scientists is guided by the Decade Profile 1990—2000 which aims harnessing the potential of space technology for developmental tasks such as communications (including remote area communication and emergency communication), TV broadcasting (including educational TV for eradication of illiteracy and providing continuing education), radio networking, meteorological observation including disaster warning and resources survey management. Well defined projects are formulated for each element and the project reports and associated technical reports provide detailed guidelines as to the technologies to be developed, fabrication needs, facilities required, testing and qualification programme, launch schedules and all other relevant details concerning the respective project/activity. INSAT-2C/D/E, IRS-1C/1D, PSLV and GSLV are some of the major projects on which detailed guidelines are available to space scientists.

(c) 5,450 Scientists/Engineers are engaged in space research of which about 50% are below 40 years of age.

(d) The emoluments of Scientists/Engineers differ depending upon the posts/grade held by them as follows :—

Sl. No.	Grade	Total monthly emoluments
		Rs.
1.	Scientist/Engineer-SB	4,390
2.	Scientist/Engineer-SC	4,774
3.	Scientist/Engineer-SD	6,460
4.	Scientist/Engineer-SE	7,820
5.	Scientist/Engineer-SF	8,820
6.	Scientist/Engineer-SG	9,719
7.	Scientist/Engineer-G	11,071
8.	Scientist/Engineer-H	11,071
9.	Outstanding Scientist	12,707

The above emoluments are at the minimum of the pay scale and is inclusive of all normal allowances (DA, HRA, CCA) at the rates applicable in major locations of Space Centres.

Research in the field of Space

4397. CHOWDHRY HARI SINGH : Will the PRIME MINISTER be pleased to state :

(a) whether active research in a number of space science areas is pursued in several universities, research institutions and other organisations in the country through funding/support provided by the Department of Space; and

(b) if so, the details thereof ?

THE MINISTER OF STATE IN THE PRIME MINISTER'S OFFICE (SHRI BHUVNESH CHATURVEDI) : (a) Yes, Sir.

(b) Active research in a number of space science areas is currently being pursued in about 20 universities and research institutions with funding support from the Department of Space (DOS).

Under the RESPOND scheme, a number of space science projects have been undertaken in the areas of astrophysical plasma, cosmic evolution, cometary dust and plasma processes, solar radiation and its interaction with earth's magnetosphere, ionospheric phenomena including generation of Spread-F and plasma irregularities, middle atmopsheric processes involving mechanisms of interactive phenomena between radiative, dynamical, chemical and electro-dynamical characteristics, meteoro-